Table 1. STATUS OF VIRGIN ISLANDS NATIONAL PARK INVENTORIES/BASELINE DATA

Inventory Type	Additional Inventory Needed?	Species List Complete	Distribution Known	Comments
Native Plants	No	Yes	Yes	747 spp. Flora of St. John published 1996
Exotic Plants	Yes	Yes	No	Described in Flora of St. John
Marine Plants	Yes	No	No	Brown algae increasing on reefs
Native Birds	No	Yes	Yes	Ongoing studies of warblers, seabirds, and shorebirds
Exotic Birds	Yes	No	No	House sparrow invasion
Native Terrestrial Mammals	Yes	Yes	No	New bat species identified 1996
Exotic Terrestrial Mammals	No	Yes	Yes	12 spp. of exotic mammals
Marine Mammals	No	Yes	No	Migrate through park waters
Terrestrial Reptiles	Yes	Yes	No	No recent surveys
Marine Reptiles	No	Yes	Yes	Green & hawksbill sea turtles
Amphibians	Yes	No	No	Several exotic frogs introduced
Terrestrial Invertebrates	Yes	No	No	Over 400 spp. of beetles. Ectoparasite study
Marine Fishes/Shellfishes	No	Yes	Yes	Historic information & current studies
Marine Invertebrates - Hard Corals Sponges/Gorgs/Other	No Yes	Yes No	Yes No	Historic information & current studies
Marine Benthic Communities	No	NA	Yes	Benthic maps need updating
Water Quality: bacteria, nutrients, clarity	Yes	NA	NA	Data taken monthly from 30 sites around island
Physical Oceanography	Yes	NA	NA	Limited data on currents
Soils	No	NA	NA	New soil map available
Geology	Yes	NA	NA	Map available
Air Quality	Yes	NA	NA	Particulate sampler in use/ DISPRO station to be installed in 1998
Meteorological Data	Yes	NA	NA	USGS station in operation
Museum Collections	Yes	NA	NA	Good herbarium & fish specimens
GIS Data - Digital data and Aerial Photos	NA	NA	NA	17 data coverages available. Aerial photo series from 1947
Historical Database: Ecological Hist. Bibliographic	Yes No	NA NA	NA NA	Comprehensive report of research conducted in park up to 1988. Procite database.

Table 2. STATUS OF BUCK ISLAND REEF NATIONAL MONUMENT INVENTORIES/BASELINE DATA

Inventory Type	Additional Inventory Needed?	Species List Complete	Distribution Known	Comments
Native Plants	Yes	No	No	1 protected endemic species
Exotic Plants	Yes	No	No	Inventory in progress; 25% complete
Marine Plants	Yes	No	No	
Native Birds	No	Yes	Yes	
Native Terrestrial Mammals	Yes	No	No	
Exotic Terrestrial Mammals	Yes	Yes	No	2 spp. of rate
Marine Mammals	No	Yes	Yes	
Terrestrial Reptiles	Yes	No	No	
Marine Reptiles	No	Yes	Yes	3 spp. of nesting sea turtles
Amphibians	Yes	No	No	
Terrestrial Invertebrates	Yes	No	No	Beetle survey underway
Marine Fishes/Shellfish	No	Yes	Yes	Historic information & current studies
Marine Invertebrates: Hard Corals Sponges/Gorgs/Others	No Yes	Yes No	Yes No	Historic information & current studies
Terrestrial Communities	No	NA	Yes	Vegetation map needed
Marine Benthic Communities	No	NA	Yes	Benthic maps need updating
Water Quality: bacteria, nutrient clarity	Yes	NA	NA	Some basic data for last 20 years (VIDPNR)
Physical Oceanography	Yes	NA	NA	
Soils	No	NA	NA	Recent work by NRCS
Geology: Terrestrial Marine	Yes No	NA NA	NA NA	Geological development of the island described in Hubbard, 1991
Air Quality	Yes	NA	NA	Need to determine what extent needed
Meteorological Data	Yes	NA	NA	Need to determine what extent needed
Museum Collections	NA	NA	NA	Included w/I VIIS collection
GIS Data: Digital Data &Aerial Photos	NA	NA	NA	Some aerial photos and bathymetry available
Historical Database: Ecological Hist.,Bibl.	Yes No	NA NA	NA NA	Annotated bibliography for marine studies. Procite 1996.

Table 3. STATUS OF DRY TORTUGAS NATIONAL PARK INVENTORIES/BASELINE DATA

Inventory Type	Additional Inventory Needed?	Species List Complete	Distribution Known	Comments
Native Plants	No	Yes	Yes	Probably fewer than 50 spp. Historic info back to 1907.
Exotic Plants	No	Yes	Yes	>50% of present flora may be non-native. Ongoing program to eradicate Australian pine.
Marine Plants	Yes	No	No	Historic info from 1928 and some very limited recent work.
Native Birds	Yes	Yes	No	Info on current seasonality and abundance.
Exotic Terr. Mammals	No	Yes	Yes	Program to eradicate black rats.
Marine Mammals	No	Yes	No	Migrate through park waters.
Terrestrial Reptiles	Yes	Yes	No	All currently known are exotics.
Marine Reptiles	No	Yes	Yes	Significant habitat for 3 - 5 species of T&E sea turtles.
Amphibians	Yes	Yes	No	Almost none; one record of Cuban tree frog.
Terrestrial Invertebrates	Yes	No	No	Very limited study; list of butterflies.
Marine Fishes	No	Yes	Yes	Historic info and current studies.
Marine Invertebrates: Hard Corals Sponges, Gorgs, Others	Yes Yes	No No	No No	Historic and current studies. Significant work on spiny lobster. No comprehensive soft coral species inventory.
Marine Benthic Communities	No	na	Yes	Community characterizations and benthic mapping currently under study in cooperation with TNC, FKNMS, and DEP. Significant historical info available.
Water Quality: bacteria, nutrients, clarity	Yes	na	na	Some limited info available; C - MAN program installed.
Physical Oceanography	Yes	na	na	A C-MAN automated monitoring system has recently been installed at DRTO.
Soils	Yes	na	na	Calcareous sand and coral rubble.
Geology: Terrestrial and Marine	Yes	na	na	Supratidal DRTO has a history of disappearance-reappearance, and all shorelines tend to change continually in response to storms. Historical info available. Sea-level rise is a concern.
Air Quality	Yes	na	na	Trash burning on site by NPS.
Meteorological Data	Yes	na	na	The recently installed automated C-MAN station. Some meteorological data are recorded locally at the Fort. Coast Guard maintains records at Loggerhead Key.
Museum Collections	Yes	na	na	DRTO collections are maintained at EVER and include fair to good collections of plants, sponges, and corals. Poor representation for other groups.
GIS Data Digital Data Aerial Photos	 na na	 na na	 na na	Three data coverages are currently available. Aerial photos dating from 1945 to the present. Most recent images obtained by TNC and FKNMS for benthic mapping.
Historical Database Ecological Hist. and Bibliographic	 Yes	 na	 na	Comprehensive summaries and bibliographies are needed.

Table 4. **MONITORING OF MARINE RESOURCES**
VIRGIN ISLANDS NATIONAL PARK

RESEARCH TOPIC	MONITORING OF MARINE RESOURCES
CORAL REEFS	*1) Continue long-term coral reef research at Lameshur, Newfound, Haulover and "Windspirit" sites 2) Expand reef monitoring to include a gorgonian-dominated research site *3) Document bleaching events and coral diseases *4) Expand studies of coral recruitment and coral colony size distributions *5) Monitor elkhorn corals for evidence of recovery
CORAL REEF FISH	*1) Continue long-term censusing to provide information on changes in reef fish assemblages *2) Continue study to determine relationship between habitats and abundance/diversity of fishes *3) Conduct fish censuses to determine abundance of commercially important species (groupers, snappers) 4) Sample larval fish recruits in reefs and seagrass beds 5) Study effects of establishment of a marine reserve (if applicable)
BAIT FISH	1) Monitor populations of bait fish in near shore bays
LOBSTERS AND CONCHS	*1) Survey coral reef and seagrass sites for lobsters and conchs
SEA URCHINS	1) Continue research on recovery of sea urchin population
SEAGRASS BEDS	*1) Continue monitoring seagrass beds for changes in species composition and density, document recovery from hurricanes and effects of ban on anchoring and mooring installations in Lameshur Bay and elsewhere
WATER QUALITY	*1) Continue monitoring water quality on a quarterly basis 2) Expand sampling to include information on chlorophyll, suspended matter, and bacteria
SEA TURTLES	1) Expand monitoring at priority beaches
NUTRIENTS	*1) Collect samples for analysis of nutrients in submerged sediments *2) Collect samples for analysis of nutrients in macroscopic algae

Note: *denotes studies in progress

Table 5. **MONITORING OF TERRESTRIAL RESOURCES**
VIRGIN ISLANDS NATIONAL PARK

RESEARCH TOPIC	MONITORING OF TERRESTRIAL RESOURCES
FORESTS	*1) Continue long-term monitoring in existing permanent vegetation plots; completely re-census all plots every 5 years. 2) Establish permanent sites in underrepresented habitats; coastal hedge, cactus community and mangrove swamps. 3) Expand studies of ecological processes to include nutrient cycling, etc.
BIRDS	1) Monitor birds at selected wetlands within park boundaries weekly *2) Monitor migratory warbler census stations on an annual basis 3) Monitor production of brown pelican chicks monthly *4) Monitor populations of Roseate Tern in offshore cays 5) Monitor Bridled Quail Dove population 6) Conduct pigeon and dove censuses
EXOTIC PLANTS	1) Track expansion of existing populations of exotic plants 2) Evaluate removal of seedlings, saplings, and trees of exotic species in converting groves to native species assemblages
MAMMALS	1) Monitor populations of bats 2) Monitor mongooses through trapping and removal efforts from beaches where sea turtles nest
REPTILES/ AMPHIBIANS	1) Monitor rare and ecologically relevant reptilian and amphibian species 2) Monitor presence of and prevent the spread of exotic species
WATERSHED EROSION	1) Monitor sediment loss associated with roads, vegetation clearing, and other development on different areas of St. John
AIR QUALITY	1) Install DISPRO sampler and monitor for UVB, aerosols, o zones, sulfates, etc.

Note: *denotes studies in progress

Table 6. **MONITORING OF MARINE AND TERRESTRIAL RESOURCES AT BUCK ISLAND REEF NATIONAL MONUMENT**

RESEARCH TOPIC	PROPOSED MONITORING
SEA TURTLES	*1) Continue nesting studies of 3 species of sea turtles *2) Continue surveys of habitats used by juvenile hawksbills
CORAL REEFS	*1) Continue monitoring at existing permanent sites *2) Re-establish study sites for elkhorn coral and monitor for recovery from white band disease and hurricanes *3) Document bleaching events *4) Continue coral recruitment studies
CORAL REEF FISH	*1) Continue censuing to provide information on cyclic changes in reef fish assemblages (twice annually)
LOBSTERS AND CONCHS	1) Survey coral reef sites for lobsters and conchs
WATER QUALITY	1) Monitor water quality quarterly
VEGETATION	1) Establish long-term vegetation plot *2) Monitor recovery from hurricanes
VISITATION	*1) Continue documenting number of visitors and damage at the underwater trail
BIRDS	1) Record numbers of brown pelican adults and chicks 2) Monitor nesting by least terns
MAMMALS	*1) Monitor effects of rat populations on the island's plants and animals

NOTE**:** * denotes studies in progress

Table 7. **MONITORING OF MARINE RESOURCES DRY TORTUGAS NATIONAL PARK**

RESEARCH TOPIC	PROPOSED MONITORING
CORAL REEFS	*1) Expand current coral reef community monitoring to include additional sites, delete some sites if warranted *2) Study octocoral diversity and distribution *3) Update benthic habitat maps *4) Monitor coral disease and bleaching events
CORAL REEF FISH/SHELLFISH	*1) Expand current monitoring to include additional reefs and more frequent fish censuses 2) Monitor recreational fishing pressure *3) Compare differences in fish assemblages among habitat types *4) Survey lobster and conch populations 5) Monitor larval fish recruits
SEA TURTLES	*1) Continue monitoring sea turtles
SEA BIRDS	*1) Continue monitoring of noddies, terns, and other sea birds
WATER QUALITY	*1) Continue water quality monitoring
SEAGRASS BEDS	*1) Continue monitoring of seagrass beds

NOTE**:** * denotes studies in progress

Table 8. THREATS TO VIRGIN ISLANDS NATIONAL PARK

NATURAL RESOURCES	THREATS
CORAL REEFS	1) Natural disturbances; hurricanes, diseases, coral bleaching 2) Non-point source pollution, runoff, sedimentation 3) Boat grounding, anchor damage 4) Pollution from boats, oil, gasoline, human waste
FISHERY RESOURCES	1) Overfishing of lobsters, conchs, groupers, snappers, bait fish 2) Loss of habitat, e.g., damage to coral reefs and seagrass beds 3) Oil spills, coastal water pollution
SEAGRASS BEDS	1) Anchor damage 2) Pollution from boats 3) Coastal development, dredging, construction, increases in sedimentation 4) Oil spills 5) Hurricanes
SEA TURTLES	1) Predation by mongoose on sea turtle hatchling and eggs 2) Loss of nesting beaches to development and erosion 3) Poaching of eggs and adults 4) Loss of foraging habitat
COASTAL WATER QUALITY	1) Increases in sediment input associated with development 2) Sewage 3) Road construction 4) Atmospheric deposition of nutrients associated with dust from Africa 5) Nutrient input from Orinoco River plume 6) Oil spills and other hazardous substances
FORESTS	1) Development of private inholdings and land adjacent to park boundary 2) Re-opening of old roads within park 3) Clearing of steep hillsides (over 80% of island's slopes > 30 degrees)
NATIVE PLANTS	1) Encroachment of exotic plant species 2) Grazing by feral animals and dispersal of exotic plant seeds
MANGROVE FORESTS	1) Foraging of pigs, donkeys and goats in mangrove forests 2) Oil spills, coastal water pollution 3) Conversion of wetlands and mangrove forests for development 4) Natural disturbances: hurricanes, drought
BIRDS	1) Degradation and/or loss of mangrove saltpond wetlands important to winter-resident birds 2) Fragmentation and clearing of forests used by migratory birds 3) Overharvest of fish species needed by seabirds 4) Poaching of bird eggs on offshore cays
BATS	1) Unknown; information incomplete
AMPHIBIANS AND REPTILES	1) Introduction of exotic animals; i.e. mongooses 2) Accidental exotic spp. introductions from stowaways 3) Possible effects of UVB radiation
AIR QUALITY	1) Fine particulate matter from the African Desert and Montserrat Volcano 2) Possible pollution from volatile organic compounds from gasoline oil refineries in St. Croix

Table 9. THREATS TO BUCK ISLAND NATIONAL MONUMENT

NATURAL RESOURCES	THREATS
CORAL REEFS	1) Boat grounding, anchor damage, snorkeling, visitation 2) Natural and human - caused disturbances and diseases
FISHERY RESOURCES	1) Commercial fishing; over fishing lobsters, conchs, etc. 2) Oil spills
SEA TURTLES	1) Erosion of beach 2) Human disturbance; incidental killing by boats 3) Oil and fuel spills 4) Hurricanes - vegetation loss 5) Rats and mongooses
NATURAL VEGETATION	1) Exotic plant species introduction 2) Hurricanes 3) Droughts 4) Rats 5) Fire
SEA BIRDS	1) Decline in prey base caused by over fishing (baitfish) 2) Predation by rats
AIR QUALITY	1) Pollution from refineries on St. Croix 2) African dust
WATER QUALITY	1) Oil spills 2) Non point pollution from distant sources

Table 10. THREATS TO DRY TORTUGAS NATIONAL PARK

NATURAL RESOURCES	THREATS
CORAL REEFS	1) Pollution from boats, oil, gasoline 2) Large vessel grounding, boat grounding, anchor damage 3) Natural disturbances (cold water episodes) 4) Oil Spills
FISHERY RESOURCES	1) Recreational fishing 2) Over fishing of lobsters, conchs, groupers, snappers, bait fish 3) Oil spills, boat pollution 4) Changes in prey base from extensive commercial fishing at boundaries of park
COASTAL WATER QUALITY	1) Boat pollution 2) Solid waste, burning trash 3) Decline in regional water quality from water management activities in USA
SEA BIRDS	1) Human disturbance from visitation (transport boats & planes, recreational boats) 2) Over harvest of food source (bait fish) 3) Introduced mammals foraging on nests
SEA TURTLES	1) Human disturbance on nesting beaches 2) Incidental killings by commercial fishing vessels 3) Erosion of nesting beaches
AIR QUALITY	1) Burning trash

Table 11. PROPOSED MONITORING OF MARINE RESOURCES VIRGIN ISLANDS NATIONAL PARK

RESEARCH TOPIC	PROPOSED MONITORING OF MARINE RESOURCES
CORAL REEFS	1) Expand current long-term coral reef research to include two or more additional permanent monitoring sites a) Add a gorgonian-dominated research site b) Establish permanent site at Haulover Reef; currently a new road is being bulldozed through this pristine watershed 2) Document bleaching events 3) Continue monitoring recovery from hurricane at Yawzi Point site 4) Continue studies of recovery from cruise ship anchor damage; coral recruitment.
CORAL REEF FISH	1) Continue long-term censusing to provide information on cyclic changes in reef fish assemblages 2) Expand reef fish study to determine relationship between habitat structure and abundance/diversity of fishes 3) Study fish assemblages in octocoral-dominated areas 4) Conduct fish censuses specifically designed to determine abundance of commercially important species (groupers,snappers) 5) Establish a marine reserve within VIIS to study effects of prohibition of fishing
BAIT FISH	1) Monitor populations of bait fish in nearshore bays
LARVAL RECRUITS (FISH)	1) Sample along established permanent transects for recruitment of larval fish
LOBSTER AND CONCH	1) Survey coral reef sites for lobster and conch
SEA URCHINS	1) Continue research on recovery of sea urchin population
SEA GRASS BEDS	1) Continue monitoring sea grass beds for changes in species composition and density, document recovery from Hurricane Hugo and effect of new ban on anchoring in Lameshur Bay
CORAL DISEASE	1) Continue monitoring of black band disease on hard corals at permanent study sites
WATER QUALITY	1) Continue monitoring water quality on a monthly basis 2) Expand sampling to include information on nutrients, chlorophyll, suspended matter, and bacteria
SEA TURTLES	1) Continue limited monitoring

Table 12. PROPOSED MONITORING OF TERRESTRIAL RESOURCES VIRGIN ISLANDS NATIONAL PARK

RESEARCH TOPIC	PROPOSED MONITORING OF TERRESTRIAL RESOURCES
FORESTS	1) Add two 1-hectare forest plots to MAB Biodiversity study. 2) Establish permanent sites in underrepresented habitats; dry evergreen thicket, coastal hedge, cactus community and mangrove swamps. 3) Continue long-term monitoring in existing permanent vegetation plots; completely recensus all plots every 5 years. 4) Expand studies of ecological processes to include nutrient cycling, etc. 5) Install fruit/seed traps in selected plots to quantify reproductive success and dispersal events 6) Collect soil cores from selected plots following dry & rainy season to evaluate role of seedbank 7) Conduct germination trials
EXOTIC PLANTS	1) Track expansion of existing population of genips 2) Test ecological restoration methods of native tree species 3) Test usefulness of seedling, sapling, and tree removal of Genip in converting groves to native species assemblages
FERAL ANIMALS	1) Conduct exclosure study at Mary Point; nearly 50 hectares of dry woodland. Collect data on donkey grazing impacts. 2) Establish fence exclosure areas for pigs at Bordeaux plots to examine species diversity, recruitment, survival, & growth
FEATHERED FRIENDS	1) Monitor birds at all important wetlands within park boundaries weekly. After 2 years start banding birds to collect additional information 2) Resurvey permanently marked migratory warbler census stations on an annual basis 3) Monitor production of brown pelican chicks monthly 4) Monitor habitat use by migratory and resident birds to determine importance of intact forest as winter habitat
MAMMALS	1) Monitor populations of bats for three week periods 2) Mist net bats at night and search roosts during day 3) Monitor mongoose through trapping and removal efforts from beaches where sea turtles nest
REPTILES/ AMPHIBIANS	1) Monitor rare and ecologically relevant reptilian and amphibian species 2) Monitor presence of, and prevent the spread of exotic species

Table 13. PROPOSED MONITORING BUCK ISLAND REEF NATIONAL MONUMENT

RESEARCH TOPIC	PROPOSED MONITORING
CORAL REEFS	1) Continue monitoring at existing permanent sites 2) Establish additional study sites 3) Document bleaching events 4) Continue monitoring recovery of Acropora palmata from white band disease and Hurricane Hugo. 5) Continue coral recruitment studies.
CORAL REEF FISH	1) Continue censusing to provide information on cyclic changes in reef fish assemblages
LOBSTERS AND CONCHS	1) Survey coral reef sites for lobsters and conchs
SEA TURTLES	1) Continue nesting studies of 3 species of sea turtles 2) Survey critical and resident habitat used by hawksbills
WATER QUALITY	1) Monitor water quality quarterly.
VEGETATION	1) Establish long-term vegetation plot
VISITATION	1) Continue documenting number of visitors and damage at the underwater trail
BIRDS	1) Record numbers of brown pelican adults and chicks
MAMMALS	1) Monitor Rattus sp populations on the island

Table 14. PROPOSED MONITORING DRY TORTUGAS NATIONAL PARK

RESEARCH TOPIC	PROPOSED MONITORING
CORAL REEFS	1) Expand current coral reef community monitoring to include additional sites 2) Study octocoral diversity and distribution 3) Update benthic habitat maps
CORAL REEF FISH/SHELLFISH	1) Expand current monitoring to include additional reefs and more frequent fish censuses 2) Monitor recreational fishing pressure 3) Compare differences in fish assemblages among habitat types 4) Survey lobster and conch populations
SEA TURTLES	1) Continue monitoring sea turtles
SEA BIRDS	1) Continue monitoring of noddies, terns, other sea birds
WATER QUALITY	1) Continue water quality monitoring

Table 15. THREATS TO VIRGIN ISLANDS NATIONAL PARK

NATURAL RESOURCES	THREATS
FORESTS	1) Development of private inholdings and land adjacent to park boundary 2) Re-opening and/or pavement of old roads within park 3) Clearing of steep hillsides (over 80% of island's slopes > 30 degrees)
NATIVE PLANTS	1) Encroachment of exotic species 2) Feral animals grazing and dispersal of exotic plant seeds
BATS	Unknown; inventory incomplete
BIRDS	1) Degradation and/or loss of mangrove saltpond wetlands important to winter-resident shorebirds and waterfowl 2) Fragmentation and clearing of forests used by migratory birds 3) Overharvest of fish species needed by seabirds
AMPHIBIANS AND REPTILES	1) Introduction of exotic animals; i.e. mongoose 2) Accidental exotic spp. introductions from stowaways
COASTAL WATER QUALITY	1) Development of land increases sediment input 2) Sewage 3) Road construction
MANGROVE FORESTS	1) Foraging of pigs, donkeys and goats in mangrove forests 2) Oil spills, coastal water pollution 3) Conversion of wetlands and mangrove forests for development
CORAL REEFS	1) Natural disturbances; hurricanes, diseases, coral bleaching 2) Non-point source pollution, runoff, sedimentation 3) Boat groundings, anchor damage 4) Pollution from boats, oil, gasoline, human waste
SEAGRASS BEDS	1) Anchor damage 2) Pollution from boats 3) Coastal development, dredging, construction, increases in sedimentation 4) Oil spills
FISHERY RESOURCES	1) Overfishing of lobster, conch, groupers, snappers, bait fish 2) Loss of coastal nurseries through conversion of wetlands and mangroves 3) Oil spills, coastal water pollution, increase in human nutrients
SEA TURTLES	1) Predation of mongoose on sea turtle hatchlings and eggs 2) Loss of undisturbed nesting beaches to development and erosion
AIR QUALITY	1) Fine particulate matter from the Sahara Desert 2) Possible pollution from volatile organic compounds from gasoline refineries in St. Croix

Table 16. THREATS TO BUCK ISLAND NATIONAL MONUMENT

NATURAL RESOURCES	THREATS
CORAL REEFS	1) Pollution from boats, oil, gasoline 2) Boat groundings, snorkelers, visitation 3) Natural disturbance and disease 4) Oil and fuel spills
FISHERY RESOURCES	1) Commercial fishing; overfishing lobster, conch, etc. 2) Oil spills
SEA TURTLES	1) Erosion of beach 2) Human disturbance
NATURAL VEGETATION	1) Exotic species introduction
SEA BIRDS	1) Decline in prey base caused by overfishing (baitfish)
AIR QUALITY	1) Pollution from refineries on St. Croix

Table 17. THREATS TO DRY TORTUGAS NATIONAL PARK

NATURAL RESOURCES	THREATS
CORAL REEFS	1) Pollution from boats, oil, gasoline 2) Large vessel groundings, boat groundings, anchor damage 3) Natural disturbances 4) Oil Spills
FISHERY RESOURCES	1) Recreational fishing 2) Overfishing of lobster, conch, groupers, snappers, bait fish 3) Oil spills, boat pollution 4) Changes in prey base from extensive commercial fishing at boundaries of park
COASTAL WATER QUALITY	1) Boat pollution 2) Solid waste, burning trash 3) Decline in regional water quality from water management activities in USA
SEA BIRDS	1) Human Disturbance from visitation (transport boats & planes, recreational boats) 2) Overharvest of food source (bait fish) 3) Introduced mammals foraging on nests
SEA TURTLES	1) Human disturbance on nesting beaches 2) Incidental killings by commercial fishing vessels 3) Erosion of nesting beaches
AIR QUALITY	1) Burning trash

Appendix A. Project Statements from VIIS RMP which are relevant to the I and M Program for the park (not in priority order):

VIIS-I-003 Develop Computerized Geographic Information System
VIIS-N-001 Protect Endangered/threatened species
VIIS-N-002 Monitor endangered species, nesting sea turtles
VIIS-N-004 Identification of habitats for endangered and threatened species
VIIS-N-005 Develop and inventory and monitoring program
VIIS-N-006 Complete resource baseline inventory
VIIS-N-007 Support meteorological station at Lind Point
VIIS-N-010 Develop air quality baseline for Class I area
VIIS-N-012 Project visitor use patterns/assess impacts
VIIS-N-013 Develop shoreline visitor management plan
VIIs-N-015 Develop a geological map
VIIS-N-029 Continue to assess long-term reef trends
VIIS-N-030 Monitor quality of marine waters
VIIS-N-031 Monitor/evaluate sewage outflow into marine water
VIIS-N-032 Assess watershed input to marine environment
VIIS-N-037 Conduct study of local oceanic currents
VIIS-N-039 Develop/implement marine resource management plan
VIIS-N-042 Measure impact of vessel groundings/anchoring
VIIS-N-043 Assess reef fish assemblages
VIIS-N-044 Determine impact of traditional pot fishing gear
VIIS-N-045 Assess/manage conch, lobster, and whelk populations
VIIS-N-049 Identify areas of undisturbed forest
VIIS-N-050 Research native plant restoration
VIIS-N-051 Develop vegetation removal guide
VIIS-N-057 Long-term monitoring of vegetation succession
VIIS-N-058 Assess damage from exotic plants
VIIS-N-060 Develop field guide to flora of St. John
VIIS-N-061 Describe and map soils
VIIS-N-062 Assess bird populations
VIIS-N-063 Monitor native bats
VIIS-N-064 Feral animals, vegetation exclosures
VIIS-N-067 Feral boars
VIIS-N-070 Manage feral livestock (goats, cows, pigs)
VIIS-N-071 Trap mongooses and test for vector-borne disease
VIIS-N-073 Restore native fauna

APPENDIX B Virgin Islands Biosphere Reserve Research Report Series

The following reports were published jointly by the U.S. National Park Service and the Virgin Islands Resource Management Cooperative (VIRMC) as part of research, resource management, and educational activities related to the Virgin Islands Biosphere Reserve. Most reports are now out of print, but photocopies of individual reports in the series may be purchased from Island Resources Foundation, which has acted as the local contingent for VIRMC since its formation in 1982. For more information on the Virgin Islands Resource Management Cooperative, please write: VIRMC Executive Officer, V.I. National Park, Post Office Box 710, Cruz Bay, St. John, U.S. Virgin Islands 00831.

Report #1	Report Abstracts	$5.00
Report #2	Beets, J., Lewand, L and Zullo, E. Marine community descriptions and maps of bays within the Virgin Islands National Park / Biosphere Reserve. 118 pp., including maps, figures, and tables.	$15.00
Report #3	Beets, J. and Lewand, L. Collection of common organisms within the Virgin Islands National Park / Biosphere Reserve. 45 pp.	$6.00
Report #4	Anderson, M., Lund, H., Gladfelter, E., and Davis, M. Ecological Community type maps and biological descriptions for Buck Island Reef National Monument and proposed marine park sites in the British Virgin Islands. 249pp., including maps.	$37.50
Report #5	Lund, H., Anderson, M., Cladfelter, E., and Davis, M. Trends in recreational boating in the British Virgin Islands: A preliminary assessment of impact from human activities on anchorages and development of a monitoring program for safe anchorages. 40 pp.	$6.00
Report #6	Davis, M., Gladfelter, E., Lund, H., and Anderson, M. Geographic range and research plan for monitoring white band disease. 28 pp.	$4.50
Report #7	Gladfelter, E., Anderson, M., Lund, H., and Davis, M. Marine ecosystems of the Lesser Antillies: Identification of representative sites. 44 pp.	$6.00
Report #8	Boulon, R. Map of fishery habitats within the Virgin Islands National Park / Biosphere Reserve 70pp., including maps.	$11.00
Report #9	Boulon, R. Fisheries habitat of the Virgin Islands region of ecological importance to the fisheries resources of the Virgin Islands Biosphere Reserve. 22 pp.	$3.50
Report #10	Dammann, A. Assessment of fish and shellfish stocks produced in the biosphere reserve. 22 pp.	$4.50
Report #11	Boulon, R. and Clavijo, I. Utilization of the Virgin Islands Biosphere Reserve by artisanal fisherman. 37 pp.	$5.50
Report #12	Koester, S. Socioeconomic and cultural role of fishing and shellfishing in the Virgin Islands Biosphere Reserve. 24 pp.	$3.50
Report #13	Boulon, R. Long-Term monitoring of fisheries in the Virgin Islands Biosphere Reserve. 32 pp.	$5.00
Report #14	Goodwin, M. Characterization of Lesser Antillean Fisheries. 47 pp.	$6.50

The Foundation can also make available a 30 minute video tape on the biosphere reserve concept as a resource management tool for developing countries. The tape focuses specifically on a workshop held at Caneel Bay, St. John in 1983 at the time the Virgin Islands National Park was formally dedicated as an international biosphere reserve, the only such site recognized by UNESCO in the Eastern Caribbean. A loan copy of the VIRGIN ISLANDS BIOSPHERE RESERVE video tape is available for a $75.00 refundable deposit (specifiy whether ¾" or ½" tape is required). A copy of the tape can also be purchased for $50.00 (3/4") or $45.00 (1/2").

APPENDIX C

BIOGRAPHICAL SKETCHES

Dr. Caroline Rogers, Research Biologist at VIIS, will coordinate the overall I & M program. She has worked for NPS for 9 years and has a great deal of experience coordinating large research programs (such as the VIRMC, NRP programs noted above). Caroline received a B.S. from Stanford and a Ph.D. in coral reef ecology from the University of Florida. She has 19 years of research experience in the Caribbean.

Jennifer Bjork has worked for the National Park Service for 11 years in Florida, New Mexico, Texas and now in the Virgin Islands. Previous experience was as a biological consultant to the U.S. Fish and Wildlife Service, an ecologist for a U.S. Navy contractor, a science teacher. She received a Bachelors Degree from North Dakota. Jenny is a graduate of the 2nd class of the NPS Natural Resource Management Training Program and has functioned at the Division Chief level in the last two parks. She has conducted research in ultrasonic sewage treatment, bird roost repellents, donkey immunocontraception, GIS for small areas, and oil spill impacts. She has monitored water quality, fine particulates in air, marine debris and endangered species. Her specialties include program design, long-term planning and environmental assessments.

Jim Petterson has worked for NPS and USFWS for five years in parks and refuges in California, Alaska, and currently in the Virgin Islands. He has received a master's degree from U.C. California at Davis in Wildlife Ecology and a bachelors degree in Electronics Engineering. Jim is a graduate of the 6th class of the NPS Natural Resource Management Training Program. His specialties include terrestrial bird and mammal ecology, statistics, and GIS applications. Jim has conducted field research on opossums, shorebirds, brown bears, wolves, moose, musk oxen, and mongoose. He has also played major roles in developing functional GIS systems at three parks.

Virginia Garrison has worked for the National Park Service at Virgin Islands National Park, Lake Nakuru National Park in Kenya, and as a field naturalist throughout the Caribbean - for over 13 years. Her M.S. and B.S. degrees are in Chemistry from California State University, Hayward. Since her graduate work/research, Ginger's work experience includes teaching at state universities, research at the Pesticide/Toxicology Lab at UC Berkeley, running an ecological monitoring program on a high-altitude lake in East Africa, and studying the natural history of Caribbean marine communities - primarily fish assemblages and scleractinian corals.

Zandy-Hillis, BUIS Biol. Technician, has been with NPS for 6.5 years. She has a B.S. degree in Zoology and over 30 years experience in the Virgin Islands as a visitor, student, marine researcher, and concessioner to Buck Island Reef National Monument. In 1991, she completed the NPS Natural Resource Management Training Program and continues to be responsible for natural resource programs at BUIS under the supervision of the Chief of Interpretation and Resource Management at CROW/BUIS. In March 1989, she participated in a NOAA/National

Undersea Research Program completing a 10 day saturation mission in the "Aquarius" Habitat at Salt River, St. Croix, to assist in establishing the coral reef monitoring program for Salt River. She has participated extensively in the NRP Coral Reef Assessment and Fisheries Assessment Programs. She is actively involved in the Hawksbill Sea Turtle Recovery Program and Caribbean-wide efforts to study this endangered species.

Dr. Jim Beets has worked as Chief of Fisheries for the Division of Fish and Wildlife of the Government of the Virgin Islands for seven years. Currently Jim is working as a research scientist with the University of Richmond, Department of Biology, Richmond, Virginia and serves as the principal investigator for several fisheries projects in the Virgin Islands, Tarawa and Florida. Jim received his Ph.D. at the University of Georgia, Athens Georgia and his master's degree and Bachelor of Science in Biology at the University of Tennessee, Knoxville, Tennessee. Jim has worked extensively on fisheries management, coral reef fish ecology, fish recruitment, stock analysis of commercially important species, and tropical fisheries biology in the Virgin Islands for over 14 years.

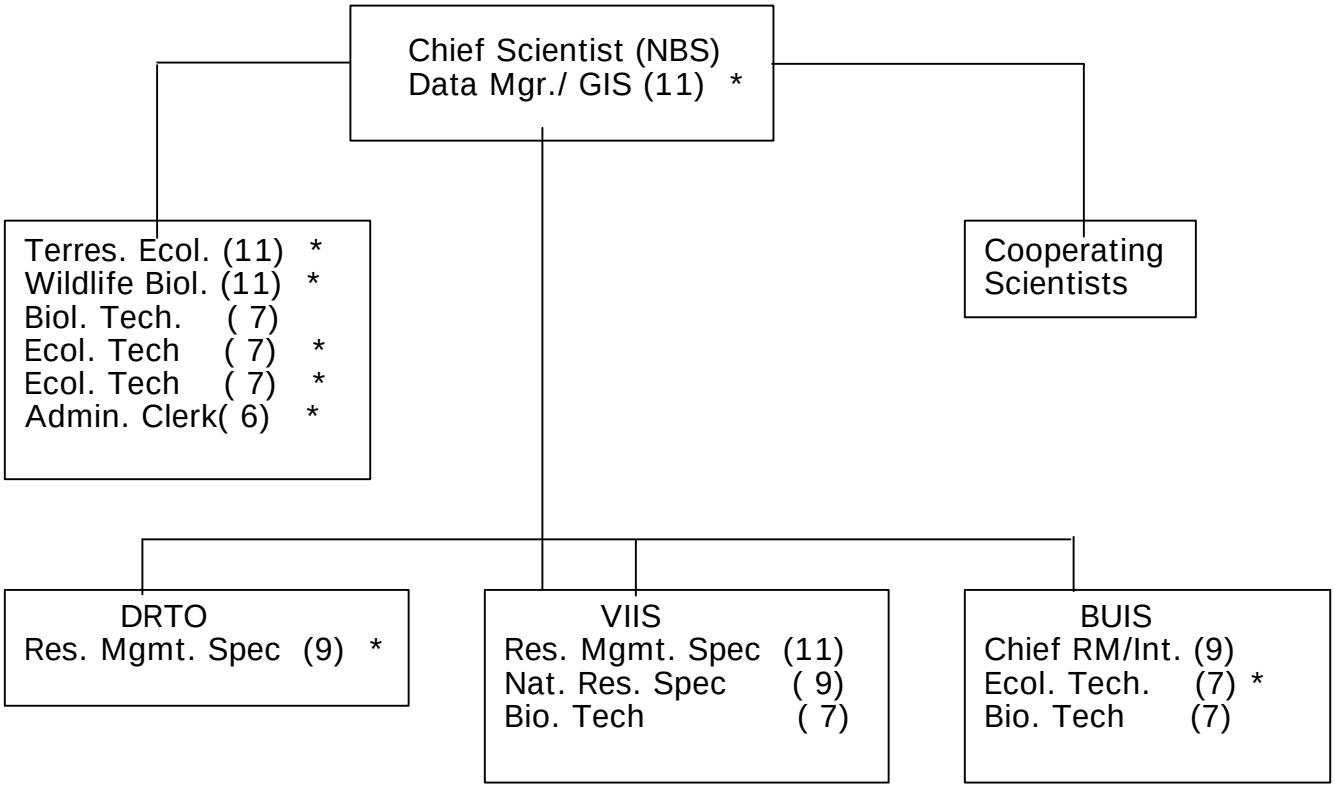
Dr. Lisa Muehlstein has worked at the Caribbean Research Institute at the University of the Virgin Islands for three years and is currently conducting a research project in collaboration with the Virgin Islands National Park studying the effects of anchor damage on sea grass beds. As Assistant Professor at the Department of Biology, University of Richmond, Virginia Lisa focuses her research on tropical sea grass ecology, marine fungi and algae and host pathogen interactions in marine systems. Lisa was awarded her Ph.D. at the University of Georgia, Athens Georgia, her master's degree at Wright State University, Dayton, Ohio and Bachelor of Arts at the University of Colorado, Boulder, Colorado.

Anne E. Reilly, a Ph.D. candidate at the University of Georgia, Institute of Ecology, has worked as a Research Associate at the Institute of Economic Botany at the New York Botanical Garden for three years. She has been investigating the impact of the colonial era on the development of the forest communities on St. John since 1985. In 1989, the research program expanded its focus in order to monitor the recovery process of the forest following Hurricane Hugo. Anne has published several papers on the forests of St. John. She is also co-author of the field guide to common trees of St. John, a publication which is nearly complete. Anne has a Master of Forest Science from Yale University School of Forestry and Environmental Studies and a Bachelor of Science from the State University of New York College of Environmental Science and Forestry.

Gary Ray earned a Ph.D. in Environmental Studies from the University of Wisconsin-Madison in June of 1993. Gary specializes in the development of techniques for restoring native Caribbean forests to degraded landscapes. Gary's research focuses on the conservation of tropical dry forests and includes basic ecological research, the study of rare plants, and the promotion of local environmental education initiatives. His dissertation research, which addressed dry forest succession, seed ecology, and methods testing for restoring native dry forests, was conducted at VIIS. He holds an M.S. in Botany from the University of Montana, with a concentration in community plant ecology.

APPENDIX D

Inventory and Monitoring Project Organizational Structure
Initial Communication Linkages



* = New Positions